Research concerning the improvement of the core employability of college students based on the "1+X" certificate system and the "Six Steps and Five Links" method

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Abstract. Comprehensive analysis of and research concerning the current situation and successful experiences with improving the core employability of college students both at home and abroad were the focus of this paper. According to the training programs used for various specialties and the national policies, based on the "1+X" certificate system, an approach to talent cultivation known as the "Six Steps and Five Links" method was proposed, which took future employment as its orientation, the enhancement of students' employability as its goal, and talent demand as its operating platform. A six-step teaching method covering counselling, planning, decision, administration, examination and evaluation was integrated into the practical training session, which consisted of the five aspects of basic skills training, professional skills training, integrating skills training, productive integrating skills training and on-the-job internship training. Analysis of variance model and analysis of covariance model were used to analyze and study students' vocational skills, and a complete set of analytic results was produced. This paper used a university in Jiangsu Province that employed the talent cultivation mode of the"1+X" certificate system and the "Six Steps and Five Links" method as an example of practical teaching. The research results showed that the students' mastery of various vocational skills was significantly improved.

Keywords: "1+X" certificate system; "Six Steps and Five Links" method; talent training mode; core employability; promotion.

1 Introduction

Due to the increasing popularity of higher education, an oversupply of college graduates has become prevalent, the employment situation of college students is not optimistic. This problem has attracted increasing attention from the government and academia. The core employability of college graduates to be competitive in the employment environment is an important means to solve it. Therefore, it is particularly important to cultivate and tap college students' core employability, expand their em-

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ployment skills, and alleviate the structural contradictions associated with employment.

There are many research literatures on how to improve the employability of college students at home and abroad. Gregory & Maja proposed that courses based on the SOAR (self-awareness, opportunity awareness, ambition and results) model, courses for integrated work learning and career development learning can allow students to participate actively in a personalized learning experience. This experience can help students achieve their personal career goals when entering the workplace. This method provides a practical model for college students' career development [1]. Through a literature survey and interview surveys, Olojuolawe et al. found a mismatch in terms of skills between education in colleges and the labor market in Nigeria, such that students lacked the skills to work in the 21st century. They proposed establishing an employability framework considering disciplinary differences to determine the hierarchical structure of of employment using a one-parameter analysis model. After this framework was applied, graduates' unemployment rate decreased significantly [2]. Kim discussed the important effects of digital literacy and learning strategies on core employability by analyzing data on 916 college students from 10 Korean universities, including statistics, testing, analysis, and equation modeling,. The results showed that the digital literacy associated with learning strategies had a significant effect on core employability and that learning strategies constituted a catalyst for digital literacy [3]. Based on the development experience connected with the employability training system adopted by Anglia Ruski University in the UK, Wang & Yao proposed a conception of talent training based on overall and whole process design, incorporated employability training into the curriculum, serialized training activities and projects to form a complete process and hierarchical employability training system focusing on employability training, and provided comprehensive employment services to cultivate college students' employability [4].

In this paper, by implementing the"1+X" certificate system and integrating the six-step teaching method of counselling, planning, decision, administration, examination and evaluation into five practical aspects: skills training in basic, professional, integrating, and productive integrating and on-the-job internship, the curriculum system and teaching scheme were formulated, and college students' comprehensive vocational abilities were cultivated. This model prepared students for employment in advance and enhanced their core employment competitiveness to cultivate applied professionals with the advanced skills that are needed by society.

2 Theoretical Framework

2.1 "1+X" Certificate System

The "X" in the"1+X" certificate refers to several vocational skill level certificates, which validate the vocational skills of graduates and members of society and reflect the comprehensive ability required for professional activities and personal career development. The 1+X certificate system is not merely the combination of an academic certificate and a vocational skill level certificate, let alone the addition of an employ-

ment threshold to applied universities and vocational colleges. It is not intended to institute an independent talent evaluation system in addition to the learning system employed in applied universities and vocational colleges but rather to encourage these institutions to reform their education and teaching systems, improve students' learning processes and learning methods, and broaden and improve students' employment and entrepreneurship abilities through evaluating and certifying their vocational skill levels [5].Zhang claimed that the 1+X certificate system was a new way of strengthening students' comprehensive quality and professional ability. Comprehensive professional ability includes employability, working ability and innovation and entrepreneurship ability. Employability refers to the core qualities of career development, such as learning ability, thinking ability, comprehensive ability, social ability and leadership ability. Working ability refers to working practice ability associated with a specific occupation. Innovation and entrepreneurship refer to the ability to adapt to changes and entrepreneurial development based on vocational skills. This system fully develops students' potential, allows them to make full use of their strengths, and improves their likelihood of future employment [6]. Jin & Chen claimed that the 1+X certificate system enhances the talent supply capacity of the universities and vocational colleges in which it is implemented. Talent supply ability refers to schools' ability to train talent by adapting to actual needs and rapidly adapt to changes in industrial technology. It aims to address structural problems associated with specialty settings, curriculum content arrangement and talent training modes; takes local economic development as its starting point; and focuses on promoting local economic and social development as its guiding principle [7]. Duan & Chen claimed that due to continuous education reform and deepening national efforts toward vocational education talent training, vocational education should not merely focus on students' integrating vocational skills but also promote the integration of social and industrial needs with the training objectives of higher vocational education by applying the 1+X certificate system [8].

2.2 "Six Steps and Five Links" Talent Training Mode

Based on the connotations of integrating production and education, a curriculum featuring this integration was developed through investigating industry enterprises and extracting typical work task cases. Relying on the school training room and fully leveraging the advantages of school enterprise cooperation resources, a practical training of Five Links was established that included training in basic, professional, integrating, and productive integrating skills and post-job practice. Through training in basic, college students applied the professional theoretical knowledge that they had learned to practice, gained a certain intuitive understanding of basic skills [9]. Through training in professional, college students became familiar with the principles of assigned project tasks, were able to complete assigned project tasks independently. Following integrating skills training, college students had a overall learning of the professional theoretical knowledge and practical operation associated with assigned project tasks, had basically developed the analytical and practical ability required to complete these tasks. Qualified students in integrating skills training would take part in productive integrating skills training, receive enterprise assignments, proficiently complete actual

assigned project tasks and actual operational processes in various positions in the enterprise's real working environment. These students directly took part in production process in enterprise positions with their professional counterparts and completed the post internship process so that they could fully fulfill all the responsibilities of their internship positions, take on their own affairs, which were great challenging, cultivate their innovation ability [10]. In the teaching process of the five link practical ability cultivation system, student-centered, professional skills as carriers, task oriented, and a six-step teaching method was integrated, namely counselling, planning, decision, administration, examination and evaluation, fully tapping into the subjectivity and innovative spirit of students, enabling them to construct the meaning of the knowledge they have learned. [11]. Consultation was the collection of knowledge and skills needed to solve problems by searching for information; The plan was to carefully analyze and evaluate the knowledge and skills collected above, and formulate solutions to solve problems. Decision-making involved discussing the feasibility of this solution in groups and determining a final solution. Implementation entailed carrying out work tasks according to the resulting final plan. Inspection was conducted to test the implementation and effects of the final plan. Evaluation involved assessing the problems that occurred with respect to practical ability training and methods that needed to be improved. In the whole process of practical ability training, the six-step teaching method was always integrated into the five skills training links, so as to realize the organic combination of teaching process and teaching result, the perfect combination of all-round training and partial training, thus ensuring the quality of practical teaching [12]. The schematic diagram of "Six Steps and Five Links" talent training mode is shown in Figure 1.

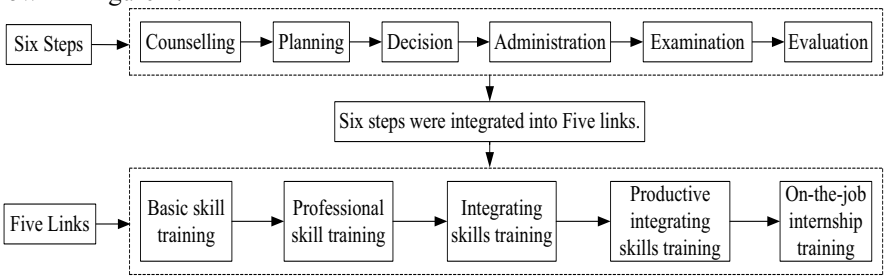

Fig. 1. The schematic diagram of "Six Steps and Five Links" talent training mode

2.3 College Students' Core Employability

The general employability refers to the ability to obtain employment, maintain employment, and regain employment if needed following graduation, and is a combination of theoretical knowledge, professional skills and working attitude that are possessed by the student and attractive to employers. The composition of general employability includes five categories of skills: basic, professional, adaptive, developmental and communication. Different from the general employability, the core employability is a kind of development ability for college graduates' sustainable employment, which means that college graduates have accumulated knowledge or quality to a certain level,

have strong basic professional skills, skilled practical ability, and basic ability to analyze and solve problems. Tomlinson claimed that core employability is a necessary comprehensive ability for college students, which takes professional skills as its center and pertains to resources such as human, society, culture, identity and psychology. This ability is mainly developed by enriching one's own knowledge; comprehensively mastering the corresponding professional skills; and cultivating one's ability to adapt to complex environments, teamwork and organizational coordination; solve practical problems; and forge ahead and pursue excellence and innovation. It involves a wide range of social contacts, focuses on the surrounding interpersonal relationships, and develops its own form of employment ability advantage based on its deep professional heritage and humanistic quality [13]. Zhao et al. believed that the main factors affecting the core employability of college students included academic achievement, personality traits, social capital, student origin, career planning, etc. The colleges could improve college students' employment adaptability to society by strengthening entrepreneurship and employment education, and pay attention to the development of students' human capital and psychological capital. The families gave college students more emotional support and interactive communication to avoid their worries. The college students should give full play to their main role and actively participate in student associations and social practice. Only through the joint participation of society, colleges and universities, families and themselves, could they cultivate college students' core employment ability in an all-round and multi-level manner [14]. Liu & Chu believed that the core employability was the key ability embodied by individuals in the process of employment. This key ability made job seekers personalized and special, and could help job seekers stand out from many competitors. They put forward that the core employability of college students was generally divided into four parts in the new era, self-cognitive ability, environmental cognitive ability, innovation and entrepreneurship ability and career management ability [15].

2.4 Multivariate Covariance Analysis

Covariance analysis is a statistical analysis method that involves adjusting the impact of covariates on the dependent variable to more effectively analyze experimental processing effects. It is also a comprehensive method of variance analysis and regression analysis for statistical control of experiments. Separating the influence of covariates on the dependent variable from the independent variable can further improve experimental accuracy and statistical test sensitivity. Covariance analysis is a population parameter used to measure the magnitude of the "covariation" between two variables, that is, the parameter of the mutual influence between two variables. The larger the absolute value of covariance, the greater the mutual influence between the two variables. [16].

To further understand individual differences in learning motivation, Li & Wang took total scores on the learning motivation questionnaire and scores pertaining to its factors in the posttest as dependent variables, the corresponding pretest scores as covariates, and the experimental groups as independent variables for covariance analysis to examine the influence of experimental groups on learning motivation. The research

results showed that the pretest motivation score had a significant impact on the posttest score. After controlling for the pretest learning motivation score, the experimental grouping had a significant impact on the total score of learning motivation and the scores of various factors in the posttest, thus indicating that knowledge competition can significantly improve college students' internal and external learning motivation [17]. Guided by four research questions and four research hypotheses, Awodeyi & Udo studied the effects of combined therapy, including the use of multiple activities and games as teaching strategies, on middle school students' geometric concept learning performance and knowledge memory. The Kuder Richardson 21 formula and the reliability coefficient r =0.87 were used to collect mathematics performance test (MPT) data. The analysis of covariance and the hypothesis test were used to analyze the data under the condition that $p \leq 0.05$. The results showed that the combination therapy (CT) used in the experiment significantly improved students' performance and knowledge memory ability [18]. Bayrak & Gürses had preparatory teachers of chemistry majors employ the problem-based learning method. The experimental and control groups were determined by the random sampling method. The three-dimensional concept achievement test, the scientific process skill test and the chemical attitude scale were used as data collection tools. The data were analyzed using analysis of covariance, an independent t test and descriptive statistical methods. The results showed that problem-based learning could help preparatory teachers understand the basic concepts of professional courses more effectively than traditional methods [19].

3 Improvement of College Students' Core Employability Based on the "1+X" Certificate System and the "Six Steps and Five Links" Method

3.1 The Connotations of College Students' Core Employability Based on the Talent Training Mode of the "1+X" Certificate System and the "Six Steps and Five Links" Method

Against the backdrop of the 1+X certificate system, higher education should combine the relevant national education and teaching standards, the education and training characteristics of various majors and the vocational skill level certificates corresponding to each major, namely, the "X". The six step teaching method of counselling, planning, decision, administration, examination and evaluation would be integrated into the practical ability training in basic, professional, integrating, and productive integrating and on-the-job internship, focusing on the cultivation of five categories of skills of college students: basic, professional, adaptive, developmental and communication. A new talent training plan would be developed, corresponding curriculum and teaching plans would be established, and an evaluation system for college students based on the "Six Steps and Five Links" training model would constructed. The schematic diagram of the connotations of college students' core employability based on the talent training mode of the "1+X" certificate system and the "Six Steps and Five Links" method is shown in Figure 2.

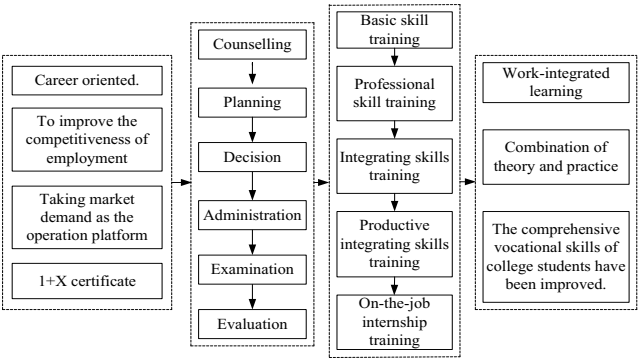

Fig. 2. The schematic diagram of the connotations of college students' core employability based on the talent training mode of the "1+X" certificate system and the "Six Steps and Five Links" method

3.2 Ways of Improving College Students' Employability Based on the "1+X" Certificate System and the "Six Steps and Five Links" Method

(1) Guiding college students to learn independently to improve their basic skills.

China's primary and secondary education has always adopted a teacher centered teaching model, which has led to many students relying on teachers for learning. In the early stages of higher education, many students are not adapted, so university teachers need to help students change their previous learning methods and guide them to learn independently. Most students in primary and secondary education do not have the ability to learn independently because of their unsound way of thinking. They usually accept knowledge passively in a dull classroom atmosphere. In this way, students gradually develop bad learning habits during their education, such as waiting and relying on others. Throughout the basic skills training process, the six-step teaching method was constantly employed so that the training could be relaxed; the training quality could also be ensured, and a solid theoretical foundation could be laid for the Six Steps and Five Links talent training mode [20].

(2) Enabling college students to achieve a combination of working and learning to improve their professional skills.

The educational purpose of "career oriented, student-centered" required university teaching to revolve around the teaching ideas of "project driven, combination of theory and practice, and integration of knowledge and action", optimize talent training programs, adjust professional structures, improve curriculum systems, using information technology, strengthen practical teaching activities, and promote teaching methods such as project task teaching, typical case teaching, and work process teaching. In the teaching process, universities always adhered to the educational principles of serving social and economic development, employment oriented, comprehensive ability cultivation as a means, market supply and demand as the operating platform, and improving the core employment ability of college students as the goal. They built a collaborative education platform for school enterprise cooperation, achieved resource

sharing, and promoted deep integration between schools and enterprises [21]. To embody the principles of "integration of teaching, learning and doing" and "combining work and learning" in professional courses, teachers organized teaching to feature practical work content; collected, organized, summarized and integrated the typical work tasks associated with professional courses; and tailored the courses by adapting the learning situation to ensure its suitability for teaching. The whole teaching process was thus made completely "practical", thereby improving the associated tasks and practices, enhancing the deep connection between the teaching and the enterprise production processes, and helping improve students' professional skills [22].

(3) Referring to teaching models such as the dual system to enhance students' comprehensive skills

China's higher education institutions adopted unified examination papers for enrollment, and students generally had weak hands-on skills. The apprenticeship system compensated for the shortcomings of emphasizing theory and neglecting practical education. Applied universities paid more attention to the completion of projects, and the future of graduates was oriented towards employment. Improving the core employability of college students was their main goal. Both the dual system and modern apprenticeship system aimed to cultivate comprehensive skills, focused on students' career development, emphasized the importance of practical hands-on learning, and integrated six step teaching into the practical hands-on process. Students might gain inspiration for technological progress through their understanding of actual work content, imitation of operational processes, communication with colleagues, and division of labor and collaboration in work tasks. In the German dual system and the modern apprenticeship system, training in comprehensive skills and abilities is usually conducted by enterprises and colleges jointly. Both parties have clear responsibilities and a clear distribution of work, and they formulate a scientific and rational talent training plan and system in collaboration with one another [23]. Teaching courses and textbooks were developed in accordance with talent training objectives; staged teaching and staged evaluation were conducted jointly; work tasks and teaching contents were effectively connected; and the teaching steps of consultation, planning, decision-making, implementation, inspection and evaluation were completed in the context of work tasks.

(4) Building high-level practical training bases to enhance students' productive comprehensive skills and work skills.

A high-level training base was a real environment production and teaching place that integrated practical training teaching, vocational training, vocational skill level assessment, and technical service to society. It was also a place for "1+X" certificate vocational skill level assessment. By strengthening the connotation construction of high-level practical training bases, integrating the six step teaching method, deepening the deep integration of industry and education, serving local economic development, a highland for cultivating high-level technical and skilled talents had been created. [24]. The enterprises were an integral aspect of industry-university cooperation and the main operational and input-providing body involved in the base development. Through the development, colleges and enterprises identified the best point of entry for talent training goals and talent needs. College instructors, employers and other professionals

jointly organized and established guidelines for practical links. Combined with the six-step teaching method, the colleges deepened the teaching reform in terms of the aspects of basic knowledge, professional skills, professional ethics, comprehensive ability, etc.; designed the curriculum content and system and practical teaching system in a rational manner; increased the proportion of practice and training in teaching; produced innovations regarding the form of postjob practice; strengthened the ability to assess and evaluate practice and training with the goal of educating people; and educated people when necessary in accordance with the employers' postjob needs, enterprise culture, management characteristics, etc. to cultivate the skilled talent demanded by enterprises [25].

3.3 Analysis of Covariance to Evaluate the Talent Cultivation Model Based on the "1+X" Certificate System and the "Six Steps and Five Links" Method

Although the core employability of college students could not be quantified, and the professional skill scores could not be taken as the assessment index completely, the professional skill test scores had strong objectivity and comparability, which could reflect the core employability of college students laterally. However, it was not fair to evaluate the differences between the new and old talent training models, different textbooks and different teaching levels across teachers only by comparing the results of the professional skills end-of-term examination, because the differences in students' basic qualities would also affect the later learning effect [26]. Therefore, it was of great practical significance to introduce the covariance analysis method to evaluate the effect of new and old talent training models.

Covariance analysis could be used to compare the differences of dependent variables at different levels. The dependent variable was affected by another (or several) variables related to it at the same time. Usually, the dependent variable was represented by Y, and the variables related to it was covariates, represented by z. For example, the effectiveness of the training was compared across classes in the same grade. In addition to textbooks, teacher quality, talent training mode and other factors, the students' basic performance also affected the effects of the talent training mode. If the influence of students' own basic performance was considered in the evaluation of the effect of talent training model, it was necessary to employ covariance analysis, that is, first the regression analysis was used to remove the influence of students' own basic performance. Then the variance analysis was conducted to make the evaluation conclusion more appropriate to the actual situation [27].

The basic idea of the covariance analysis was to find out the quantitative relationship between each group of dependent variables and covariates by linear regression method before comparing the mean of dependent variables $\overline{Y}_i$ (i=1, 2,…, p) of two or more groups, adjust the value of covariates to be equal to control the influence of covariates on the dependent variables at the same time, so as to obtain the modified mean of dependent variables $\overline{Y}_i$ (i=1, 2,…, p) when covariates were equal. Subsequently, the variance analysis was used to compare the differences between modified means of dependent variables.

The calculation structure of the covariance analysis was more complex, and the calculation workload was larger. In order to reduce the calculation workload, the computer was usually used to introduce SPSS statistical analysis software for auxiliary calculation. SPSS software is a statistical analysis software for formulating product and service solutions, which integrates data entry, data collation, and data analysis, selects modules based on the actual needs of product and service projects and computer software functions, and quickly performs statistics and processing of data, generation and analysis of chart, output and management of result.

A covariance analysis model of multi-influencing factors was constructed with one covariate

In order to analyze whether there were significant differences in the influence of each level of all factors affecting students' test scores on the test results, it was necessary to examine the relevant test scores both before and after the influencing factors of students' test scores were generated.

There was an uncontrollable influencing factor in the test process, which was the difference of the basic score belonging to quantitative variables, and had a significant impact on students' test scores, To eliminate the influence of the difference in the students' basic scores on students' test scores in the later stage, the corresponding covariance analysis model was established, as follows:

$$\begin{gathered} y_{ijlp} = \mu + \alpha_i + \beta_j + \eta_l + \gamma z_{ijlp} + \varepsilon_{ijlp}, i = 1,2 \cdots, n; j = 1,2, \cdots, m; l = 1,2, \cdots, q; p = 1,2, \cdots, k_{ijl} \\ \sum_{i=1}^{n} \omega_i \alpha_i = 0, \sum_{j=1}^{m} \xi_j \beta_j = 0, \sum_{l=1}^{q} \delta_l \eta_l = 0 \\ \varepsilon_{ijlp} i.i.d \sim N(0, \sigma^2) \end{gathered} \tag{1}$$

Among them, z_{ijlp} represents the basic score of the p-th student from the l-th place of origin educated by the j-th teacher under the i-th talent training mode. Y_{ijlp} represents the final examination result in a professional skill course taught by the j-th teacher and the p-th student from the l-th place of origin under the i-th talent training mode. u represents the mean value of the teaching effect under the conditions of n talent training modes, m teachers and l native regions. α_i represents the teaching effect under the i-th talent training mode. ω_i represents the number of students under the i-th talent training mode. n represents the total number of talent training modes. b_j represents the teaching effect of the j-th teacher. ζ_j represents the number of students educated by the j-th teacher. m represents the total number of teachers of a professional course. c_l represents the effect value of the l-th region from which students originated. δ_l represents the number of students from the l-th region from which students originated. q represents the total number of students from different regions. d represents the regression coefficient of the covariate to the dependent variable. k_{ijl} represents the total number of students from the l-th region from which students originated who were educated by the j-th teacher under the i-th talent training mode. ε_{ijlp} represents random error. *i.i.d.* means independently identically distributed. $M(0,\sigma^2)$ indicates that the mean value of the subject random variable was 0 and that the variance of the random variable was σ^2.

SPSS software was used for data statistics and analysis.

SPSS software was used to conduct covariance analysis of relevant data, and obtain the corresponding covariance analysis table.

3.4 Experimental Design

An applied university in Jiangsu, China, featured 11 secondary colleges, including colleges of electromechanical, hydraulic, power, chemical, automotive, software, information, architectural, food, materials and environmental engineering. All but the last three colleges adopted the "Six Steps and Five Links" method based on the 1+X certificate system, which was defined as level 1. The other three secondary engineering colleges continued to employ the traditional mode of teaching, which was defined as level 2. Because most engineering students were required to take the two courses of physics and electrical engineering vocational skills, and the two courses of physics and electrotechnical vocational skills were related, the physics scores on the college entrance examination (PSCEE) and the vocational skill scores for electrical engineering (VSSEE) on the second semester final examination of the third year of university received by 2366 students during the 2020 academic year were sampled from the eight colleges. The talent training mode (RPM), the teachers (JS) and the region from which students originated (JG) in the sample represented three qualitative factors, and PSCEE was included as a quantitative factor. In this context, the factor RPM had two levels, the average value of each level was $Y_{i\cdots}$, and the number of repetitions was ω_i, i=1, 2 (as shown in Table 1). Factor JS had 24 levels, the average value of each level was $\overline{Y}_{\cdot j\cdot\cdot}$, and the number of repetitions was ζ_j, j=1, 2, …, 24 (as shown in Table 2). The bar chart of repeat number ζ_j and average value $\overline{Y}_{\cdot j\cdot\cdot}$ corresponding to each level of factor JS was shown in Figure 3. The factor JG had 25 levels, the average value of each level was $\overline{Y}_{\cdot\cdot l\cdot}$, and the number of repetitions was δ_l, l=1, 2, …, 25 (as shown in Table 3). The bar chart of repeat number δ_l and average value $Y_{\cdot\cdot l\cdot}$ corresponding to each level of factor JG was shown in Figure 4.

Table 1. Repetition number ω_i and average value $\overline{Y}_{i\cdots}$ corresponding to different levels of the factor RPM

i	1	2
ω_i	1690	676
$\overline{Y}_{i\cdots}$	79.86	73.86

Table 2. Repeat number ζ_j and average value $\overline{Y}_{\cdot j\cdot\cdot}$ corresponding to each level of the factor JS.

j	1	2	3	4	5	6	7	8	9
ζ_j	101	99	98	102	100	98	97	98	102
$\overline{Y}_{\cdot j\cdot\cdot}$	78.84	79.89	80.88	79.85	78.87	79.86	80.88	73.85	78.85

Continued Table 2 Repeat number ζ_j and average value $\overline{Y}_{\cdot j\cdot\cdot}$ corresponding to each level of factor JS.

j	10	11	12	13	14	15	16	17	18
ζ_j	99	97	97	104	95	97	99	98	96
$\overline{Y}_{\cdot j\cdot\cdot}$	79.84	80.87	72.87	78.83	74.83	80.88	72.85	78.87	74.88

Continued Table 2 Repeat number ζ_j and average value $\overline{Y}_{j..}$ corresponding to each level of factor JS.

j	19	20	21	22	23	24
ζ_j	98	99	95	103	96	98
$\overline{Y}_{j..}$	80.85	79.86	72.86	78.85	74.88	80.86

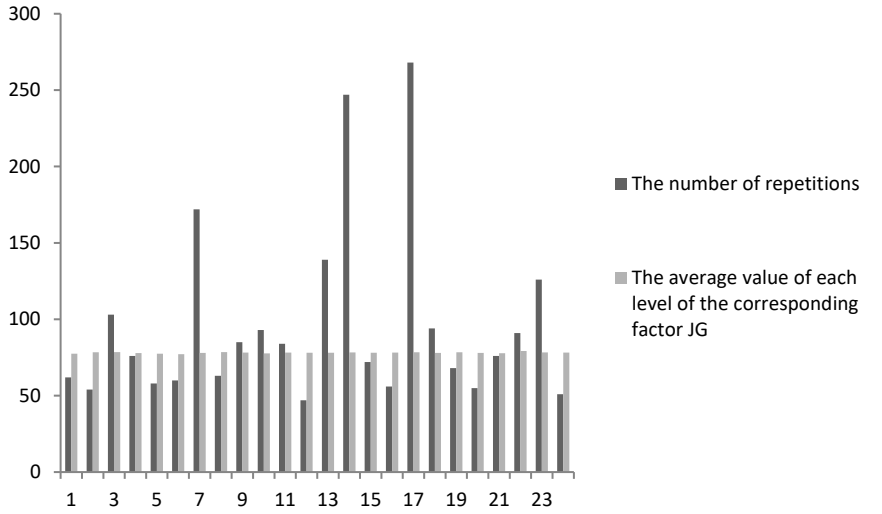

Fig. 3. The bar chart of repeat number ζ_j and average value $\overline{Y}_{j..}$ corresponding to each level of factor JS.

Table 3. Repeat number δ_l and average value $\overline{Y}_{..l.}$ corresponding to each level of factor JG

l	1	2	3	4	5	6	7	8	9
δ_l	62	54	103	76	58	60	172	63	85
$\overline{Y}_{..l.}$	77.45	78.40	78.52	77.93	77.48	77.21	77.95	78.51	78.17

Continued Table 3. Repeat number δ_l and average value $\overline{y}_{..l.}$ corresponding to each level of factor JG

l	10	11	12	13	14	15	16	17	18
δ_l	93	84	47	139	247	72	56	268	94
$\overline{Y}_{..l.}$	77.64	78.20	78.10	78.06	78.29	78.13	78.22	78.42	78.03

Continued Table 3. Repeat number δ_l and average value $\overline{Y}_{..l.}$ corresponding to each level of factor JG.

l	19	20	21	22	23	24	25
δ_l	68	55	76	91	126	51	66
$\overline{Y}_{..l.}$	78.37	78.02	77.81	79.23	78.36	78.25	78.77

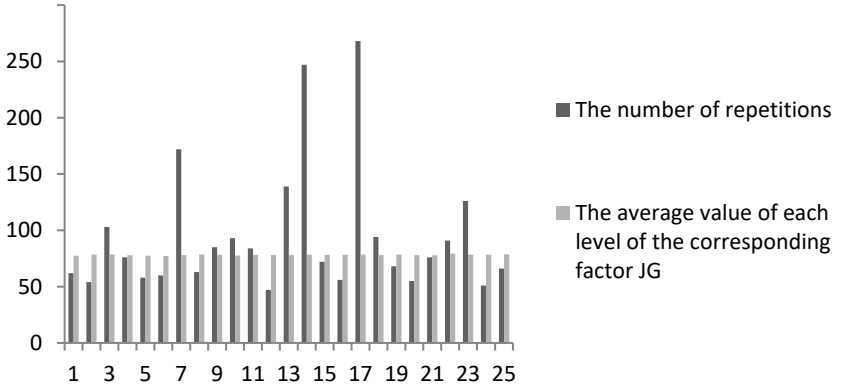

Fig. 4. The bar chart of repeat number δ_l and average value $Y_{..l.}$ corresponding to each level of factor JG.

4 The Effect of the Talent Cultivation Model Based on the "1+X" Certificate System and the "Six Steps and Five Links" Method

4.1 Use of the Variance Analysis Model to Study the Objective Factors Affecting Students' Vocational Skill Scores for Electrotechnics

The common method to analyze the impact of qualitative factors on evaluation indicators is analysis of variance. In the actual research, the sample data with different repetition times were selected. These sample data could be processed and analyzed by developing an analysis of variance model and using SPSS software to obtain the variance analysis table displaying the effects of three factors, namely, RPM, JS and JG, on the students' electrotechnical vocational skill score (VSSEE) during the second semester final examination in their third year of university. The objective factors affecting students' VSSEE were analyzed in further detail.

$$\begin{cases} y_{ijlp} = \mu + \alpha_i + \beta_j + \eta_l + \varepsilon_{ijlp}, i = 1,2; j = 1,2,\cdots,24; l = 1,2,\cdots,25; p = 1,2,\cdots,k_{ijl} \\ \sum_{i=1}^{2} \omega_i \alpha_i = 0, \sum_{j=1}^{24} \xi_j \beta_j = 0, \sum_{l=1}^{25} \delta_l \eta_l = 0 \\ \varepsilon_{ijlp} i.i.d \sim N(0, \sigma^2) \end{cases} \tag{2}$$

In this formula, the meaning of allvariables was the same as discussed above.

The colleges followed the principle of relatively balanced proportion in the enrollment of college entrance examination. In the actual research, The data distribution of the samples drawn basically conformed to the condition of relatively balanced proportion. SPSS software could be used to conduct the variance analysis of the objective factors affecting students' VSSEE to obtain the variance analysis table indicating the influence of RPM, JS, and JG on students' VSSEE during the second semester final examination in their third year of university, as shown in Table 4.

Table 4. Analysis of variance in talent training mode, teachers and native location on students' vocational skill scores for electrical engineering

Source	Sum of squares of deviations	Freedom	Mean square	*F* value	Sig.
RPM	30615.828	1	30615.828	271.624	0.010
JS	3919.752	23	170.424	1.512	0.175
JG	3254.28	24	135.595	1.203	0.227
Error	261158.338	2317	112.714		
Total	14503827.321	2366			
Corrected Total	298948.198	2365			

The fifth column in Table 4 shows the *F* value of each factor because

$$F_{0.05}(1,2317)<271.624,$$

$$F_{0.05}(23,2317)>1.512,$$

$$F_{0.05}(24,2317)>1.203.$$

Therefore, the influence of RPM on students' academic performance was significant at the 0.05 level, and the influence of JS and JG was not.

4.2 Use of a Covariance Analysis Model to Analyze the Impact of PSCEE on Students' VSSEE

Generally, the college entrance examination scores had a certain impact on students' later academic performance; in particular, the PSCEE had a greater impact on the VSSEE, but the PSCEEwas quantitative variables, so it was necessary to use the covariance analysis model to analyze its impact. Students' PSCEE and their VSSEE on the second semester final examination in their third year of university were numerical variables. These two variables had a certain degree of positive correlation. SPSS software was used to conduct correlation analysis of them, as shown in Table 5.

Table 5. Correlation analysis of students' PSCEE and VSSEE on the final examination during the second semester of their third year of university

Variable		EDS	MSIM
EDS	Pearson correlation	1	0.532*
	Sig. (2-tailed)		0.000
	N	2366	2366
MSIM	Pearson correlation	0.532*	1
	Sig. (2-tailed)	0.000	
	N	2366	2366

* Correlation is significant at the 0.01 level.

The correlation coefficient between the two variables reached 0.532, as shown in Table 5. According to Pearson's discrimination, there was a significant correlation between the two variables at a significance level of 0.01. To study the objective factors affecting students' VSSEE in further detail, the covariate, namely, PSCEE, was intro-

duced into the above variance analysis model (2). By analyzing the degree to which the covariate (PSCEE) influenced the dependent variable (VSSEE on the second semester final examination during the third year of university), the main factors that affected the students' VSSEE were identified. The covariance analysis model with covariates was as follows:

$$\begin{cases} y_{ijlp} = \mu + \alpha_i + \beta_j + \eta_l + \gamma z_{ijlp} + \varepsilon_{ijlp}, i = 1,2; j = 1,2,\cdots,24; l = 1,2,\cdots,25; p = 1,2,\cdots,k_{ijl} \\ \sum_{i=1}^{2} \omega_i \alpha_i = 0, \sum_{j=1}^{24} \xi_j \beta_j = 0, \sum_{l=1}^{25} \delta_l \eta_l = 0 \\ \varepsilon_{ijlp} i.i.d \sim N(0, \sigma^2) \end{cases} \tag{3}$$

In this formula, the meaning ofall variables was the same as discussed above.

SPSS software was used to perform covariance analysis, and the covariance analysis tablewas obtained, as shown in Table 6.

Table 6. Covariance analysis of the influence of RPM, JS, JG and PSCEE on VSSEE

Source	Sum of squares of deviations	Freedom	Mean Square	*F* value	Sig.
Corrected model	87940.523[a]	49	1794.705	18.746	0.000
Intercept	36843.525	1	36843.525	384.837	0.000
RPM	24579.295	1	24579.295	256.735	0.214
JS	3029.916	23	131.735	1.376	0.268
JG	2575.735	24	107.322	1.121	0.021
MSIM	25598.331	1	25598.331	267.379	0.000
Error	221729.208	2316	95.738		
Total	14503827.321	2366			
Corrected total	298948.198	2365			

[a] R squared=0.652 (adjusted R squared=0.637)

The fifth column in Table 6 shows the *F* value of each factor because

$$F_{0.05}(1,2316)<256.735,$$

$$F_{0.05}(23,2316)>1.376,$$

$$F_{0.05}(24,2316)>1.121,$$

$$F_{0.05}(1,2316)<267.379.$$

Therefore, the influence of RPM and PSCEE on students' academic performance was significant at the 0.05 level, and the influence of JS and JG on students' academic performance was not.

5 Discussion

The results in Table 4 suggest that the impact of teachers' teaching level on students' academic performance was not significant when colleges failed to adopt an effective incentive system or provide formal training for teachers. The influence of the different

regions from which students originated on students' academic performance was also not significant because all the regions used the same textbooks, the college entrance examination employed the same papers, and colleges admitted students of the same level. Students' learning abilities and levels of knowledge were basically identical, but their different degrees of mastery with respect to basic knowledge in high school led to differences in their college entrance examination scores. A talent cultivation model based on the 1+X certificate system and the Six Steps and Five Links method allowed students to develop their professional learning potential. Through the use of the six-step teaching method featuring consultation, planning, decision-making, implementation, inspection and evaluation, college students' practical ability was cultivated in terms of the five aspects of training in basic, professional, comprehensive, and productive comprehensive skills and postjob practice, which improved their hands-on operational ability. With respect to the problems found in the context of practical operation, the production team would discuss solutions to stimulate students' innovation ability and help them pass the postvocational skill certificate examination. This talent training mode not only facilitated the comprehensive consolidation of theoretical knowledge but also the mastery of basic professional skills. The correlation analysis was a method of statistical analysis used to study the relationships between two or more instances of sample data, and the correlations were determined in terms of the correlation coefficient, which provided a corresponding analytical foundation for whether it was subsequently necessary to introduce covariates for additional covariance analysis. Table 5 shows that the correlation coefficient between students' PSCEE and their VSSEE on the final examination of the second semester during the third year of university was 0.532, i.e., more than zero, and its absolute value was between the interval [0.4, 0.6], demonstrating a positive correlation between the two sample data points mentioned above and with a medium correlation intensity. According to this analysis, students' initial college entrance examination scores had an impact on their subsequent scores with respect to learning vocational skills, with a medium degree of impact. At later stages, practical ability training and professional skill training could systematically develop the students' learning potential, inspire and induce their innovation ability, improve their vocational skill learning scores, and thereby enhance their core employability. In addition, the goodness of fit R^2 (Goodness of Fit)noted in Table 6 measured the overall goodness of fit of the regression equation, that is, the percentage of variability of the dependent variables that the regression equation could explain. The maximum value of R^2 was 1; the closer the value of R^2 was to 1, the better the overall degree of fit of the regression equation was. As shown in Table 6, R^2 was 0.652, and the corrected R^2 was 0.637, indicating that the overall degree of fit of the regression equation was relatively good.

Comparing Tables 4 and 6, with the exception of the sum of the mean square of errors, which changed from 112.714 in Table 4 to 95.738 in Table 6, the sum of the mean square of the rest also decreased, which could explain the existence of variation in the influence of other variables on the dependent variables caused by the introduction of covariates (PSCEE). The *F* value of covariates in Column 5 of Table 6 show that at a significance level of 0.05, the covariant (PSCEE) had a significant impact on the dependent variable (VSSEE on the final examination of the second semester of the

third year of university). Therefore, the covariate was introduced into the covariance analysis model, which was important to study the factors influencing students' academic performance. The results showed that these factors included two aspects of the talent training mode based on the Six Steps and Five Links method in the context of the 1+X certificate system and PSCEE. The variance analysis and covariance analysis models discussed above took into account whether students' initial college entrance examination scores were introduced and comprehensively integrated various factors affecting students' learning performance with respect to vocational skills. The results showed that the talent training mode of the 1+X certificate system and the Six Steps and Five Links method had a significant impact on college students' learning performance in vocational skills at a significance level of 0.05.

6 Conclusion

The talent cultivation mode of the 1+X certificate system and the Six Steps and Five Links method proposed in this paper highlighted the educational concept of ability training, optimized the professional structure, integrated educational resources, and promoted deep integration between production and education and joint cooperation between schools and enterprises, thus making full use of the coconstruction and sharing of practical ability training and a foundation for professional quality training practice. The professional courses were taught in a real enterprise working environment, and the students could involve themselves deeply on the front lines of enterprise production and practice, which integrated professional and corporate culture learning, improved students' comprehensive professional abilities, and greatly reduced the teaching costs associated with professional practice courses. This mode of cultivation thus provides a theoretical reference for research on improving contemporary college students' core employability.

This paper examined improving college students' core employability based on the talent training mode of the 1+X certificate system and the Six Steps and Five Links method by reference to eight secondary engineering colleges in an application-oriented university located in Jiangsu Province. The variance analysis and covariance analysis models were used to analyze and study the main factors affecting students' vocational skill scores. The research results showed that the talent training mode had an obvious teaching effect on students' vocational skill scores and that students' different initial scores on the college entrance examination also impacted their subsequent vocational skill learning scores. This method could provide a new approach to research on improving college students' core employability in application-oriented universities at home and abroad.

Ethical Statement

Not applicable.

Data Availability Statement

All data, models, and code generated or used during the study appear in the submitted article.

Conflict of Interest Statement

We declare that we have no vonflict of interest.

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